IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Gregory L. KIRK et al.
Title:	DEVICE AND METHOD FOR MONITORING LEUKOCYTE MIGRATION
Application No.:	10/688,904
Filing Date:	October 21, 2003
Group Art Unit:	1744
Examiner:	Nathan Andrew BOWERS

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P.O. Box 1450
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PRE-APPEAL BRIEF REQUEST FOR REVIEW

SIR:

Applicants request review of the final rejection of April 19, 2007 in the above-identified application. A notice of appeal is being filed concurrently with this request. This review is requested for the reasons stated below. Applicants hereby petition for a one-month extension of time.

Summary of Invention

The present claims recite a system for monitoring leukocyte migration comprising a device including a plurality of chambers with at least one first well containing leukocytes, at least one second well, and at least one channel containing at least one leukocyte migration mediator or a plurality of endothelial cells; a first fluid stream with a first concentration, and a second fluid stream with a second different concentration, wherein the first fluid stream and the second fluid stream flow adjacent and parallel to each other without mixing, to create a dynamic concentration gradient.

The present claims also recite a method of monitoring leukocyte migration comprising passing a fluid along the surface under conditions of substantially laminar flow wherein the fluid comprises a concentration gradient that is substantially perpendicular to a direction of flow, and observing the interaction between the leukocytes and the endothelial cells.

The present claims also recite a method of monitoring leukocyte migration comprising providing a device including a plurality of chambers with at least one first well, at least one second well, and at least one channel; disposing at least one leukocyte migration mediator or endothelial cells in the at least one channel; delivering a sample comprising leukocytes to the at least one channel by laminar flow; and observing the interaction between the leukocytes and the at least one leukocyte migration mediator or the endothelial cells.

Summary of Rejections

Claims 1-5, 7, 9 and 17-19 stand rejected under 35 U.S.C. 103(a) as being allegedly rendered obvious by U.S. Patent No. 6,632,619 to Harrison ("Harrison") in view of U.S. Patent No. 6,238,874 to Jarnigan ("Jarnigan") in further view of U.S. Patent No. 6,705,357 to Jeon ("Jeon"). Claim 8 stands rejected under 35 U.S.C. 103(a) as being allegedly rendered obvious by Harrison in view of Jarnigan in view of Jeon in further view of U.S. patent No. 5,460,945 to Springer ("Springer"). Claims 10 and 12-16 stand rejected under 35 U.S.C. 103(a) as being allegedly rendered obvious by Harrison in view of Jeon. The Examiner has provisionally rejected claims 1-7, 9-12 and 17 on the grounds of nonstatutory double patenting as being unpatentable over copending Application No. 10/688905 in view of Harrison.

Summary of Arguments in Response to Rejection

With respect to the first grounds of rejection, neither Harrison, Jarnigan or Jeon, alone or in combination, teach all of the limitations of claim 1. The Examiner states that Harrison teaches a first fluid stream (inlet flow path 8') having a first concentration of a first substance and a second fluid stream (inlet flow path 8") having a second concentration of a second substance. However, 8' and 8" simply represent two channels in the device of Harrison, and the reference remains silent as to any specific concentration of the substances in these channels. Thus, Harrison does not create a concentration gradient, as recited in claim 1. Furthermore, the fluid streams in Harrison are in distinctly separate channels and are not adjacent or parallel (Fig. 2), as claim 1 recites. In the Advisory Action of June 29, 2007, the Examiner states that the "flow paths of Harrison are fully capable of carrying out the intended use set forth in the apparatus claims." However, the first fluid stream, the second fluid stream, and the dynamic concentration gradient are positive limitations of the system and cannot simply be viewed as intended use.

Claim 1 further states that the first fluid stream and the second fluid stream *do not mix*. However, the inlet flow paths of Harrison are *intended to intersect and merge* with the main flow path. In Harrison, one inlet path contains the cells of interest and a second inlet flow path contains the compound of interest. The cells and the compound mix at the point where the second flow path enters into the main flow path (col 2, lines 38-49). Therefore, the purpose of the inlet channels of Harrison is for the two substances to mix together and the invention would fail to operate as intended if the substances did not mix.

Claim 1 further states that the first well contains leukocytes and the channel contains leukocyte migration mediators or endothelial cells. Harrison broadly describes a method to study leukocyte rolling. However, Harrison does not recite the specific system of claim 1 or any of the method steps of claim 17. The Examiner states, "Harrison specifically discloses the presence of endothelial cells and various mediators such as selectins and cytokines," however the mere presence of these cells is not what is claimed; these cells must be in a specific location in the device. In the Advisory Action of June 29, 2007, the Examiner cites col 4, lines 40-45 and column 5, line 5-17 for support that the selectins and cytokines are disposed *within the channels*, however, these passages do not state anything about the location of these cells, but only generally define leukocyte rolling and candidate compounds.

With respect to claim 1, Jarnigan fails to cure the deficiencies of Harrison. Jarnigan discloses a number of sample receiving wells, such as 80, connected to subchamber 92 that receives a chemotactic agent, by capillaries 94. Since 92 is connected to all of the capillaries 94, the concentration of the chemotactic agent in each of the capillaries is the same, and a concentration gradient is only created along the length of the capillaries. Thus, Jarnigan does not have a first fluid stream with a first substance having a first concentration and a second fluid stream with a second substance having a second concentration. Furthermore, if the capillaries are considered to be the first fluid stream and the second fluid stream, they do not flow adjacent and parallel to each other without mixing, to create a dynamic concentration gradient, as recited in claim 1.

With respect to claim 17, neither Harrison or Jarnigan, alone or in combination, teach all of the limitations of claim 17. Specifically, the Examiner has failed to address the steps of disposing either a leukocyte migration mediator or endothelial cells in the channel and delivering a sample comprising leukocytes to the channel by laminar flow. As discussed above, Harrison fails to disclose these steps and Jarnigan simply mentions that leukocytes could be used but does not disclose how.

As discussed above, Harrison and Jarnigan do not disclose all of the limitations of claim 1 and Jeon does not cure this deficiency. Claim 1 states that the first well contains leukocytes and the channel contains leukocyte migration mediators or endothelial cells. As discussed above, neither Harrison or Jarnigan disclose these limitations. Jeon does not disclose a system for monitoring leukocyte migration and thus fails to disclose leukocytes, endothelial cells or leukocyte migration mediators at all.

Furthermore, there is no motivation to combine Harrison and Jeon to create a concentration gradient that is perpendicular to the direction of fluid flow. As discussed above, Harrison intends for the converging streams to mix and this is contrary to creating a concentration gradient perpendicular to the flow. The Examiner is using hindsight reasoning to combine these two references, which have the sole similarity of both being microfluidic devices. In the Advisory Action of June 29, 2007, the Examiner states "Jeon offers clear motivation that would encourage one of ordinary skill in the art to use this flow configuration." However, the only motivation the Examiner provides is that a dynamic concentration gradient is an effective

way to create gradients for the study of chemotactic cells. This reasoning does not provide motivation to use such a technique in Harrison, when Harrison clearly teaches away from this.

For at least these reasons, Applicants submit that claims 1 and 17 (and all claims that depend therefrom) are not rendered obvious by the combination of Harrison, Jarnigan and Jeon and Applicants respectfully request withdrawal of this rejection.

With regard to the second grounds of rejection, as discussed above, Harrison does not teach a first and a second fluid stream having different concentrations, and flowing adjacent and parallel to each other without mixing, to create a dynamic concentration gradient, as stated in claim 1 and neither Jarnigan or Jeon makes up for this deficiency. Furthermore, a combination of all three references with Springer does not make up for this deficiency. Springer discloses a device and method for monitoring leukocyte rolling, however the device does not disclose the system or method as claimed. Springer's device is meant to be placed under a microscope and consists of a glass slide (42) with an inlet (54) and outlet (56) for introducing the blood or leukocytes. This device does not have a channel or two wells and cannot have a plurality of chambers. Furthermore, the device operates by placing a substance onto the slide and then introducing the leukocytes to watch the reaction. This device does not allow for laminar flow of two substances and does not even disclose introducing such substances, as claim 1 (and thus dependent claim 8) states. Furthermore, the device of Springer cannot create a dynamic concentration gradient as claimed. Thus, the combination of Harrison, Jarnigan, Jeon and Springer, if possible, would still not teach the device of claim 8. For at least these reasons, Applicants submit that claim 8 is not rendered obvious by the combination of Harrison, Jarnigan, Jeon and Springer, and Applicants respectfully request withdrawal of this rejection.

With regard to the third grounds of rejection, the Examiner contends that Harrison indicates that fluids moving through the system are characterized by laminar flow, however only the dye in Example III is said to be introduced with a laminar flow to prevent mixing. Other fluids in Harrison are intended to be mixed together, as each inlet path enters the main path. Claim 10 recites the step of passing a test agent over the surface to create a concentration gradient perpendicular to the flow. Although Jeon does describe creating a concentration

gradient that is perpendicular to the direction of fluid flow, there is no suggestion or motivation to combine these two references.

The Examiner states it would have been obvious to modify Harrison "to create a system in which streams are combined into a common stream, split into a new set of separate streams, and then recombined to produce a concentration gradient that is perpendicular to the direction of fluid flow," however, the Examiner provides no motivation for such a modification. In fact, since the fluids in Harrison are intended to be mixed together (column 2, lines 38-49), Harrison teaches away from such a combination. According to MPEP §2145, it is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983). Although Jeon may teach "the importance of maintaining laminar flow" in certain instances, Harrison does not provide one of these instances. For at least these reasons, Applicants submit that claims 10 and 12-16 are not rendered obvious by the combination of Harrison and Jeon, and Applicants respectfully request withdrawal of this rejection.

With regard to the provisional double patenting rejections, Applicants request that these rejections be held in abeyance until an indication of allowable subject matter has been made.

CONCLUSION

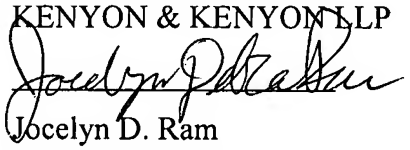
In view of the foregoing, the Examiner erred in finally rejecting claims 1-5, 7-10 and 12-19. Accordingly, favorable action on this Pre-Appeal Brief Request for Review is respectfully requested.

Any fees for extension(s) of time or additional fees required in connection with the filing of this response, are hereby petitioned under 37 C.F.R. § 1.136(a), and the Commissioner is authorized to charge any such required fees or to credit any overpayment to Kenyon & Kenyon's Deposit Account No. 11-0600.

Respectfully submitted,

KENYON & KENYON LLP

Dated: 8/20/07



Jocelyn D. Ram
Reg. No. 54,898

1500 K Street, N.W.
Suite 700
Washington, D.C. 20005
Tel: (202) 220-4200
Fax: (202) 220-4201